Space Weather Forecast

Issued on Sunday, 21 April 2024 at 01:14 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate class X-ray flares likely. Slight chance minor geomagnetic storm G1 before UTC midweek.

Solar Activity: Solar activity fell to low in the past 24 hours, with frequent mid-level Common-class X-ray flares observed, peaking at 20/1706UTC from one of the many complex sunspot regions near the middle of the facing side of the Sun.

There are currently around twelve active regions, although the partitioning of the central cluster remains complex. The main regions at present in terms of complexity (on paper) are perhaps one in the north, which saw some areal growth and emergence of intermediate spots as well as a spreading tendency. A sunspot in the northwest of the main central cluster saw growth of peripheral spots and spreading, while the final main region was one to the immediate south of this, although the growth trend here was more stable.

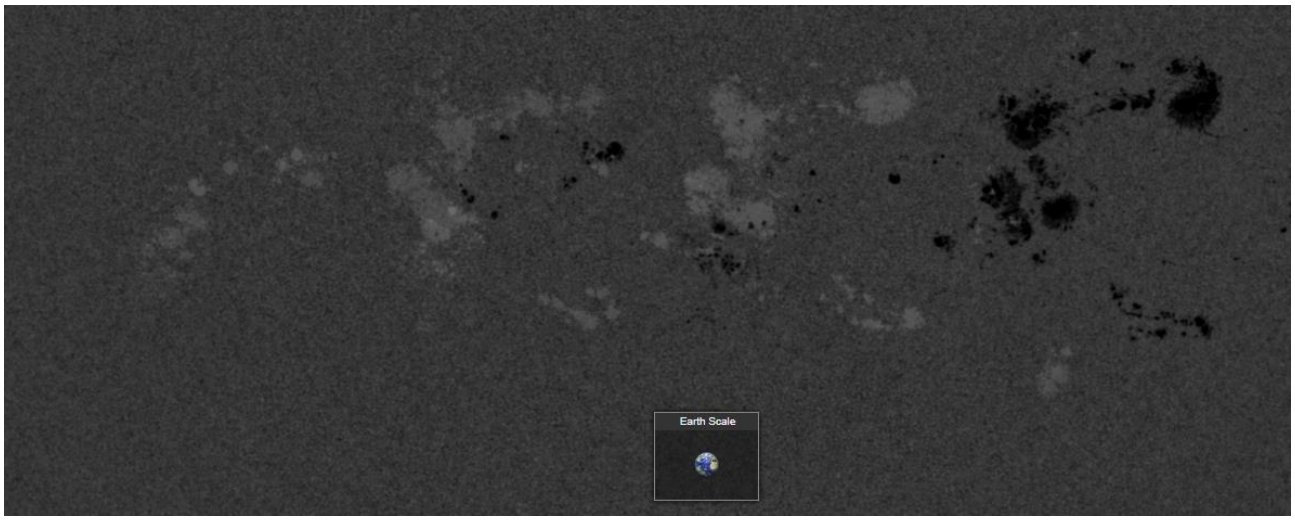

Figure 1: Helioviewer.org-derived visible difference imagery for the past 48 hours, with black sunspot region footprints valid at 20/2300UTC, with previous appearances further east in white at 19/2300 and 18/2300UTC. Note the areal growth of the sunspot in the upper right of the group over this time interval.

No new clear Earth-directed CMEs have been observed. The Moderate-class flare CME of 19 April was analysed, however unpicking its influence from the many minor CMEs in MOSWOC Enlil is not possible - it is considered likely to add to the complexity of the forecast without dominating.

The main new CME event of the past 24 hours was perhaps an emission to the southwest from the immediate vicinity of an apparently minor sunspot region. This feature has been analysed as determined to most likely miss the Earth. There were also a number of jet-like emissions seen in extreme UV imagery at 20/1130UTC, and a number of events for several hours from 20/1500UTC.

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In the latter case, this repeats behaviour seen in recent days, and these possible CMEs are felt most likely to lie off the Sun-Earth line.

Solar Wind / Geomagnetic Activity: The solar wind was relatively turbulent, however there is likely to be some component of fast wind influence in this signal.

Solar wind speeds showed a decreasing trend overall, falling through slightly elevated levels. The number of particles in the solar wind also fell over the same interval, remaining within background levels throughout. The associated magnetic field fell from an early high to a more stable trend, again all within background although the north-south component was largely anti-aligned with Earth's field between 20/0700 and 2130UTC.

The net result of the above solar wind measures was a little disturbed, but levels remained below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: No significant regions are due to arrive or leave in the period, and Moderate-class flares remain likely, with a slight chance of Strong-class.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast carries very low confidence in detail, however any enhancements are considered to peak in the G1/Minor Geomagnetic Storm range before midweek (UTC, and barring any new events).

There are a number of CMEs expected to pass near Earth, originating from the southeastern quadrant between 18 and 19 April, with the potential for weak glancing impacts between Sunday 21 and Tuesday 23 April. Otherwise, fast wind influence from a minor 'coronal hole' may become more reliable over the remainder of the current UTC weekend before gradually and erratically easing into the new UTC working week.

Geomagnetic activity is expected to be quiet for much of the period, however any additional enhancement from low confidence CME arrivals will bring the potential for occasional G1 Minor Storm intervals, perhaps most likely in the 72-hour period of the UTC days of Sunday and Tuesday (21 and 23 April).

Energetic Particles / Solar Radiation: Solar radiation storms are considered a slowly increasing slight chance due to the number of more complex sunspot regions moving into the western solar hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	20	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	70	70	70	70
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	15	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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